



**UNIVERSITAT  
JAUME·I**

Facultad de ciencias jurídicas y económicas **FCJE**

**DETERMINANTS OF CORRUPTION. AN ANALYSIS  
BASED ON INTERNATIONAL TRANSPARENCY INDEX.**

**Author: Rosa María Castillo Torres**

[al290456@uji.es](mailto:al290456@uji.es)

Degree in Economics

**Supervised by Javier Ordoñez Monfort**

Academic year: 2019/2020

May 2020

### **Acknowledgements**

I wish to thank Maria for his invaluable advice and Thomas for this patience, as well as my supervisor, Javier Ordoñez Monfort, for his help and constructive criticism.

## **Abstract**

Corruption studies have become more important in recent years. This paper aims to present a literature review on the subject, which shows a table with a summary of studies conducted by other authors and then a description of the determinants to be considered in this studies, it also takes into account that the probability of being exposed slows down the expansion of corruption. It is considered econometric specifications using panel data from 26 European Union countries between 2005 and 2015, to see what determinants can be used when designing strategies. . The determinants of corruption are going to be analyzed from the point of view of several economic models and historical factors. The objective of this paper is to analyze the impact of the different determinants of corruption and to make a comparison between regions where the studied factors have registered different values. To do so, we have based our research on different indexes, for example the IPC (index of perception of corruption), comparing the European Union with other regions of the world. The model is estimated using instrumental variables techniques; comparing variables the inequality and openness of the regions with the level of corruption.

**Key words:** corruption, European Union, transparency, inequality.

**JEL Classification:** B22, C23, H00

## CONTENTS

1. INTRODUCTION.....	5
2. THEORIES OF CORRUPTION, DESCRIPTION OF THE MODELS AND HISTORICAL FACTORS THAT DETERMINE CORRUPTION : AN OVERVIEW OF THE LITERATURE.....	6
2.1. Socioeconomic factor.....	10
2.2. Political and institutional factor.....	11
2.3. Sociocultural factor.....	13
3. DATA AND ECONOMETRIC MODEL.....	15
3.1. Data and Variables.....	15
3.2. Estimation methodology.....	19
4. MAIN RESULTS.....	19
4.1. Fixed effects estimation.....	19
5. CONCLUSION.....	23
6. REFERENCES.	

## INDEX OF TABLES

Table 1. Theories and authors.....	6
Table 2. Corruption and determinants, variables to take into account.....	15
Table 3. Main Statistics.....	19
Table 4. Correlation Matrix.....	19
Table 5. Estimation results using weighted least squares 2005-2015.....	20
Table 6. Estimation results using weighted least squares, add temporal dummies 2005-2015.....	22

## 1. INTRODUCTION

Research into the determinants of corruption remains a current topic of study. This work consists of a simple model, where through the population's perception of corruption, the economic, political and social context is studied. In any case, the models that are uniquely theoretical are not complete, so that empirical results will be sought, and although the results are not completely clear, they must be taken into account in order to be meaningful.

The present work marks as an object of study, the analysis of the crime of corruption focusing on the public sector, with the aim of reaching an approximation to reality. The second of the objectives is, deepening in this specific type of production by collecting annual data on international transparency on the perception of corruption by citizens. Understand why this crime is committed and what factors and determinants may influence, as well as the behavior of its perpetrators, in addition to observing to what extent the beliefs and social assessments of this criminal concept correspond to reality.

Currently, we can talk about various types of corruption. Political corruption and institutional transparency will be referred to and the determinants of it. Multiple economists blame the poor management of institutions to be a brake on investment, business development and innovation (Mauro, 1995). There are several definitions of corruption from various point of view; political, social and economic. For Andvig and Odd-Helge (2000), the definition of corruption is "Behavior of a representative of the State and of the public oriented towards the achievement of private profits ". There are authors who argue that corruption encourage economic growth, Rock and Bonnet (2004) maintain that in countries with a lot of centralization the bribes of big businessmen in exchange for favorable deals encourage that growth and inversion, it is their well-known Paradox of East Asia. In contrast, Mauro (1995) believes there is a negative relationship between growth and investment and corruption.

According to official data in developing countries, companies that reach agreements with public entities have paid \$ 40,000 million a year in the form of bribes. The population pays the 10 percent increase in projects due to corruption, these surcharges reach almost \$ 300,000 million. As for the companies, they distort the data on ethical business behavior. The companies that implement anti-corruption laws are more profitable since they suffer 50 percent less fraudulent cases. In 2017, the highest levels of corruption are found in countries that put obstacles in the way of communication and NGOs. In a ranking the most transparent countries are New Zealand and Denmark, on the contrary, Syria and Somalia obtain the lowest scores and are considered the most

corrupt countries (Transparency Internacional, 2009).

Over the years, Spain has worsened its situation and the perception of citizens about the corruption of their institutions is getting higher. In this fact the denunciations of the media and the protest have influenced; When a case becomes more mediated, it reaches more people and perceives corruption in a more direct way.

The structure of our work is divided into three sections. First, the description of the rent seeking model, proposed by Tullock (1967), and the analysis of the Klitgaard equation (1988). Section 2 reviews the literature on the historical factors that determine corruption: socioeconomic, political and institutional and demographic. Section 3 shows the construction and analytical decomposition of our global corruption indexes for the European Union. Section 4 explains the data source and the econometric model, including the description of the variables and the theoretical model used to design and interpret our estimation strategy. Section 5 presents the conclusions and results of the estimation.

## 2. THEORIES OF CORRUPTION, DESCRIPTION OF THE MODELS AND HISTORICAL FACTORS THAT DETERMINE CORRUPTION: AN OVERVIEW OF THE LITERATURE

There are many thinkers who have proposed theoretical models for valuing corruption. Some of the models have empirical demonstration but only the factors used and the conclusions of each model will be commented to make a comparison.

**Table 1.** Theories and authors

<b>Author</b>	<b>Year (Period)</b>	<b>Sample</b>	<b>Features (Method)</b>	<b>Conclusions</b>
Tullock	1967	Theoretical model	The economic theory of rent seeking model	The relationship between corruption and rent seeking is lower than expected.
Klitgaard	1988	Theoretical model	Corruption formula	According to the agent-director-client that is used in the model, the conclusions are positive or negative.

Mauro	1995	67 countries	Business international (BI) index of corruption	Strong negative correlation between corruption and growth.
Evans & Rauch	1996	35 countries	Contrasting the level of preparation of officials with the level of corruption	A higher level of preparation of civil servants (university degrees, entry exams ...) a lower level of corruption
Rijckeghem & Weder	1997	28 countries	Contrasting public salaries and levels of corruption	Low salaries, higher corruption. Officials seek to meet their needs with bribes.
Brunetti & Weder	1998	South Korea, Paraguay and Bolivia	Time series for the level of democracy and corruption	To increased democracy, decreased corruption.
Rock & Bonnet	2004	Industrialized countries in Asia, such as Japan and China	East Asian paradox	Corruption encourages growth in highly centralized countries (Positive Relationship)
Rock & Bonnet	2004	Hong Kong, Malaysia, Singapore...	East Asian paradox	Negative relationship, growth and investment were inversely proportional to corruption.
Hwang	2011	Asian countries	Index of ethnic fractionation (IEF) and corruption perception indexes based on Transparency International, International Business, y Countries Risk Guide.	Concluding a negative relationship; corruption has a high impact in ethnically low-fragmentation countries, as opposed to high-fragmentation ones.

**Source:** Own elaboration focusing on the previous literary review.

Then, each author and his theories will be discussed in greater detail. According to Tullock (1967) the rent seeking model is based on an individual's or entity's obtaining rents in an illicit manner and not for the habitual and legal exchange of goods or

services. In theory, the moral hazard of rent-seeking is high, when incorporating surplus loss any income search has incorporated a social cost. Puviani (1903) commented on some ways of obtaining income such as payment exemptions or tax relief. At the same time, the State uses other methods such as awarding its own contracts for the administration, both in terms of production and services.

Another Olson (1982) theory is that the preferential groups in each country exert pressure in different ways and this affects the growth rate of the country itself. In his model he uses wage rigidity as a factor, bearing in mind that forced unemployment is related to a wage level higher than the equilibrium level; this is explained by the pressure groups that keep workers who already have a job protected. When employers are able to shift the price of a higher wage to the final cost, they accept favoritism and increase unemployment and inflation. This is an example of the social cost of rent-seeking.

As per Klitgaard (1988) corruption follows a formula. The factors involved in such a formula are monopoly power, discretion and lack of transparency.

$$C=M+D-T \quad (1)$$

The focus is more on the way institutions work than on more legal ways. These conditions found in the formula are not necessary for corruption to be commented on but determining factors that contribute to its appearance. An example of anti-corruption policies is the case of the Hong Kong police. This example is more theoretical than empirical, it consists of a method that was established in the Hong Kong police to prevent bribery. After a short time many corrupt policemen were dismissed but the chief commissioner left the country with the fraudulent profits he had obtained. As a result of this event, an organization called Independent Commission Against Corruption (ICAC) was created.

It is currently one of the most famous anti-corruption bodies. As a result of this research, against more institutionalized this society a larger group of officials will seek to obtain income illegally. According to Klitgaard: 'A campaign against systematic corruption needs more than better police and better laws. It requires a jolt to the balances of corruption. The government must be bold in this shock treatment. It must encourage citizens to get involved in diagnosing and improving corrupt systems, and a first step are confidential surveys and interviews. Public officials must be challenged to design experiments with measurable results that can help break the incentive system that stimulates or demands corrupt behavior. Impunity must be eradicated'.

Finally, the model made by Mauro (1997) will be treated, empirical evidence shows that corruption decreases investment, social spending and diverts resources worsening the distribution of wealth. If countries improved their legal systems and policies of promotion and anti-corruption, the quality of life of the inhabitants would improve considerably, since more than one hundred million people live in poverty (World Bank, 2000). The author attributes to the size of the state the phenomenon of greater corruption the larger the size of the state. Mauro (1995) asserts that bureaucratic efficiency is a determining factor of corruption and is inversely related to it. Greater efficiency leads to greater political stability. Corruption results in loss of opportunity and choice of wrong projects because of rent-seeking. On the other hand, corruption lowers investment in education because the lower the level of education of citizens the greater the ability of officials to commit fraudulent acts.

According to Mauro (1998): 'corruption is likely to occur in countries where restrictions and government intervention allow excessive profits to be made', since the ultimate source used for behavior on income is the availability of rents. To illustrate, he talks about trade restrictions, industrial favoritism policies, price control and government control of credit provision. Regarding GDP growth, a highly negative relationship is concluded between the level of corruption and the growth of a country.

We focus on those more specific historical factors that determine the existence of corruption and its expansion by Spain as well as in other territories. We will take into account the causes as it influences the condition in which each country is and can not be generalized for this phenomenon.

Pharr and Putnam (2000) report in their book *Disaffected Democracies*, that the most developed countries at an economic and social level, the lack of confidence in political leaders is equivalent to the performance of these, the change of social expectations and the role of the media of information and communication. In terms of performance, a determining factor in explaining the decline in the perception of trust is the fall in ethics with which politicians act on behalf of citizens. In terms of education and social expectations, there are authors who say that a society with a high level of education is more methodical when it comes to judging its leaders, as well as being more sensitive to ethical issues. Finally, the role of the media in politics and in society is key: the news gives priority to cases of corruption and judicial cases of the rulers of the countries (Thompson, 2001).

Following the summary table of these models, the factors to be taken into account in this study will be presented, some of which will coincide with those of other authors presented in the table and others will be the result of further literary research.

## **2.1 Socioeconomic factor**

According to Bayley (1966) and others, corruption has multiplied alarmingly in the former socialist countries, so they conclude that market economies drive much higher levels of corruption and that the current economic reforms have contributed to their expansion. Corruption, its modes and characteristics are not exclusive to any specific country. Corruption in Latin America, where multiple politicians sell their administrative powers, is not different from that of the European Union, where some public officials profit from high commissions on public works concessions and defense contracts. The consequences and problems will not be treated in the same way if the corruption comes from an isolated case or is more expanded. Corruption in Canada is not similar to that of Mexico, since the causes and consequences are different.

Within the framework of the economic determinants that favor corruption, we find those that are related to the regulation of markets and the influence exerted by the state, in turn there are other agents external to the public power such as large companies, mafias and others. Analyzing corruption from an economic point of view allows the design of strategies to combat it. Some of the economic impacts of corruption are observed in the decision making of large companies is conditioned according to their objectives and productive effort. This is due to the diversion of funds from productive activities in order to corrupt the public official.

Other authors such as Luis (1985) defend corruption to the extent that the rules may be poorly drafted or excessive public intervention weakens the actions of private companies. There are studies that show a higher correlation between the monetary quantity granted by the State in subsidies as a percentage of GDP and the indicator of the degree of corruption, even though the lack of econometric demonstration due to very weak correlations makes the studies lack support .

Leite and Weidemann (1999) investigated corruption in resource-rich areas. Their work shows that these areas have a more profitable behavior, and therefore more tendency to corruption. As a variable they used the percentage of GDP, analyzing in 72 countries the exports of fuels and minerals. It is then compared with the international corruption index. The conclusion they reach is that the higher the exports are in the GDP, the higher the level of corruption.

In several studies, quite a few developing countries are at the top of the list of countries with corruption, much of it due to the process and globalization they are experiencing. Many companies take advantage of this case to demoralize their production or business activity, their objective is to reach the maximum level of profit. Seña (2000) states that further opening and liberalization of markets will not reduce corruption, as many actors are not prepared for such a big change and cannot maintain the same level as the rest of the world.

Compared to the world, with the exception of Singapore and New Zealand, Europe has lower levels of corruption, and in the case of Singapore this is due to the anti-corruption decisions made by the president in the years 1965-1990, which included rotation in public employment, salary increases and random labour inspections. At the other extreme are the countries with very high levels of corruption, such as those in Asia and Africa, and at the top of the ranking is Equatorial Guinea, which, despite its wealth in natural resources, suffers from a high level of malfeasance (World Bank, 2015)

With regard to the relationship between corruption and tax collection, Reos (2002) states that the resources available to the State are affected downwards in relation to the budget that has been estimated for that year by the implementing bodies. The main characteristic of these budgets is to allocate a maximum in terms of amount of expenditure and to approximate a value of what they expect to obtain in taxes based on the level of activity in the country. The maximum expenditure target is usually achieved, but the expected tax collection is calculated on the basis of statistical programs. Thus, when the collection is not sufficient because of corruption of public entities and collection institutions do not meet their goals, the state incurs a deficit. The way to cover the deficit is by getting into debt, acquiring obligations in future budgets, which makes the cost rise over time.

In markets with a high level of corruption, the services and goods offered are usually of inferior quality and insufficient, and at a higher cost. These cases occur in fairly corrupt markets or economies where such corruption is used to reduce quality laws or harm competitors.

## **2.2. Political and institutional factor**

In the socioeconomic field, state actions that affect the economy have been named, in this section we will deepen these aspects. When there is corruption in the political

sphere, it affects the inefficient distribution of goods to citizens, forgetting social needs and giving preference to private entities and thus generating inequality.

It is traditionally believed that the reasons for corruption were the deficits within the political system, more specifically the democratic one (Andvig, 2000). Doig and Theobald (2000) define the democratic deficit as 'the lack of optimal democracies with division of powers; and of methods of inspection and balance of institutions'.

The oligarchies as a form of government encourage corruption as they pursue maximum wealth. In an oligarchy they govern a minority group that encompasses the country's greatest wealth. When governing in the same way that used to manage their fortunes there is a relationship between political power and economic power, in this way businessmen become part of the policy and officials make their interests available to these private entities (Kaufmann, 1999). According to several studies, the countries with the highest percentage of corruption are those with authoritarian regimes rather than democratic systems (Amundsen, 1999).

In the Law of Democratization (Friedrich, 1989) it is stated that the level of corruption changes inversely according to the level of conformity of power, and it is also stated that corruption can only be fought with a democratic state.

According to Hope (2000) the relationship between democracy and corruption is negative, the lower the level of democracy a country has, the greater it is corruption. In Third World countries, corruption has been greater at the social level than at the economic level; in dictatorships and authoritarian governments corruption is found within institutions while in democratic governments there is higher competition and more agents are involved, therefore the potential for corruption is greater (Naim, 1995).

Andvig and Odd-Helge (2000) argue that there are theories that relate democracy and corruption inversely. However, a more and better developed theory would conclude that the relationship is not linear but bell-shaped. This result is explained by analyzing the process of transition from dictatorship to democracy with very high corruption, while in stable democratic or non-democratic periods corruption has no notorious presence or is much lower. In a stable government it is easier to control the average levels of corruption.

Johnston (1986) deals with various kinds of corruption depending on its internal logic; one of them is patronage and machinery networks, routine tasks that are in the hands

of very few and are used to obtain 'extended patron-client networks', making groups similar to monopolies either because of their great power of control or their benefits.

Market corruption is another type that takes place in the exchange of services and goods, either through false invoices or bribes for boosting the sale of goods on a non-regular basis. Favoritism is another form of political corruption, giving opportunities that are not available to all family members or friends because of their relationships. Finally, critical corruption involves many individuals or parties who engage in huge exchanges of goods or services. All of these exchanges usually link private companies with public entities.

### **2.3. Sociocultural factor**

To justify the study of a society's values and culture and relate them to corruption, we may think that without such values there would be no effective or solid anti-corruption institutions.

Klitgaard (1988) argues that illegal acts depend on the country in which we are and also on its culture, but the method of bribery or corruption in any country is portrayed and condemned regardless of beliefs or customs. Klitgaard's statement is reinforced by the opinion of Transparency International, which argues that while the boundaries of societies on what is right or wrong are different, in no country is it considered appropriate for politicians to be influenced in their decision-making by rewards of some kind.

Tonnies (1947) classified society into two types, the warm society and the cold society. In warm societies interpersonal, family or friendship relationships are very frequent; and the help between all the members of this network is reciprocal. By contrast, in a cold society there are no personal contacts or contacts within the family network. Under this assumption, in a cold society it would be more realistic for the government to be guided merely by economic and socially beneficial cheerleading than in a quality society, where treating people in your circle equally with people from the outside would be frowned upon, as the level of trust and relationship would not be comparable, and there is no guarantee that the official's decisions would be fair.

One of the problems that a society faces is when the hierarchy of values is not clear and the regulatory systems are not well defined, this usually happens in societies that become a modern state of one with a patrimonialist system. Public and private property

is often not well defined, and the fastest growing societies have much higher levels of corruption (Weber, 1964).

Swamy (1999) in his study on the relationship between corruption and gender has concluded that women are more adverse to receiving bribes; companies run by women have a much lower perception of corruption, in addition analyzing 66 countries where women occupy high public office levels are lower than those occupied by men.

Boix and Posner (2000) emphasize the economic and social inequalities that different communities have suffered over time. In societies where social capital is positive, it can be said that they are more egalitarian, therefore they tend to cooperate more. In societies that are more unequal, the opposite is true; the tendency is to be more particularistic. In highly unequal societies the internal social capital is not sufficient to encourage cooperation, this is due to the strict rules and trust that make cooperation outside that network impossible. Therefore it could be affirmed that social capital works in a positive way on social development when it is related to ethical and civic behaviors, norms and rules that make individuals qualify the behavior shuffling losses and gains that non-participants obtain.

According to Reos (2002) corruption and poverty are related; at the moment of decision making against higher is the cost of a project higher level of corruption exists at the time of carrying it out, since the control by the organisms designated to fight it is lower. Public contracts for works, for example, are not usually assigned to low-resource companies due to their difficulty in carrying out the contracts and their low qualifications. In many countries, small entrepreneurs are faced with administrative work and high controls and regulations that are not faced by a large entrepreneur, since the latter can avoid them by means of payments or bribes.

As a culture we can also cover the media in a country, there are authors who consider that nowadays the media report misleading or non-contrasting news and the values they promote are not completely correct.

Little (1992) indicates that in third world countries where the government is in the hands of military regimes, corruption is much higher at the level of social and human rights than at the economic level.

Brunetti and Weder (1999), conclude that the independent press helps to control corruption. One example they use is that of the Russian Federation, whose press fights for clarity and motivates the decline of corruption.

Another author who supports the theory of a free press as a method of fighting corruption is Reos (2002) who says that free access to information by citizens on the behavior and measures employed by those in power is a basic pillar in a democratic society. The information will be of public character and will be accessible to everybody, being characterized by being of non-exclusion and non-rivalry.

### **3. DATA AND ECONOMETRIC MODEL**

This section presents the variables that have been previously mentioned in the literature review as probable determinants of corruption, and that will be considered in the subsequent empirical exercise, and at the same time more variables will be proposed.

#### **3.1. Data and Variables**

The chosen sample has data from twenty-six European Union countries (1.Germany, 2.Austria, 3.Belgium, 4.Bulgaria, 5.Cyprus, 6.Croatia, 7.Denmark, 8.Slovakia, 9.Slovenia, 10.Spain, 11.Estonia, 12. Finland, 13.France, 14.Greece, 15.Hungary, 16.Ireland, 17.Italy, 18.Latvia, 19.Lithuania, 20.Luxembourg, 21.Malt, 22.Netherlands, 23.United Kingdom, 24.Czech Republic, 25.Poland, 26.Portugal)<sup>1</sup> for the period 2005 to 2015. The variables of interest are inequality (GINI index), GDPpc and several that we will detail below, as well as whether there is a significant relationship with corruption and what the symbol of that relationship.

The following table shows the variables that have previously been named by the literature as possible determinants of corruption, and which will be considered in the empirical work. Table 2 shows the endogenous (corruption perception index) and exogenous (determinants) variables analyzed. The table shows the expected signs as well as the sources and authors that support the use of these variables.

---

<sup>1</sup>The country of Romania has not been included in the sample due to problems of heterogeneity with the other countries.

**Table 2.** Corruption and determinants, variables to take into account

Category	Variable	Description	Data Source
<b>Endogenous</b>	CPI	Corruption Perception Index (Number between 0 and 100)	TI (Transparency International)
<b>Socioeconomics</b>	GDPpc (-)	GDP per capita	WB (World Bank) Leite and Weidemann (1999)
	GINI Index (+)	Income distribution among individuals (Number between 0 and 100)	WB (World Bank) Reos (2002) Boix and Posner (2000)
	Unemployment (+)	total unemployment (% of active population who do not have a job but are looking for one)	WB (World Bank)
	Military expenditure (?)	percentage of central government expenditure	WB (World Bank) Little (1992)
	Research and Development (-)	per million people	WB (World Bank) Rock and Bonnet (2004)
<b>Political and Institucional factor</b>	Seats held by women (-)	Proportion of seats held by women in national parliaments (%)	WB (World Bank) Swamy (1999)
<b>Demographic</b>	population density (?)	per kilometre	WB (World Bank)

**Source:** Own elaboration focusing on the previous literary review. To comment on the value taken by the variable, it is added to the right in brackets.

First, we must stress that the individuals who commit the corrupt act do not want it to come to light, so it is very difficult to measure it accurately. The index to be used measures the population's perception of corruption, so it will be taken as an endogenous variable. A ranking by country is created that is measured by a scale between one (1) and ten (10), against but it approaches to ten smaller it is the level of corruption in the country.

The economic context influences corruption, therefore some variables have been chosen to determine it; the first variable is the GDP per capita. This variable has been used in several studies such as that of Leite and Weidemann (1999), which helps to estimate the economic development of a country, justifies its choice and that a country in good economic conditions encourages the denunciation of corruption. The expected

sign for this variable is negative, although in studies (Di Tella, 2004) the result was the opposite.

The GINI Index is used to measure inequality (income distribution) among the population of a given country. The figures are between zero and one hundred, with zero representing perfect equality and one hundred being the maximum inequality. The expected sign of this variable is positive, since the greater the inequality, the greater the corruption the country will encounter. The expected sign of this variable is positive, since the greater the inequality, the greater the corruption the country will face.

As far as unemployment is concerned, the expected sign is positive as greater unemployment is expected to lead to greater corruption. This is because if unemployment is very high in a country, the probability that an individual will report a case of corruption is low, as there is a fear of losing the job.

The variable referring to military spending based on the total percentage of government spending in each country is used because in countries with military regimes corruption is higher, but at the same time, in countries where the law and the punishments are more severe for those who commit a crime corruption is lower. The sign of this variable is noted as indeterminate since it is necessary to see which theory is more accurate when we execute the model (Little, 1992).

With regard to research and development, the number of professionals in this field in each country has been chosen as a variable. The justification for this is that if a country is more developed and invests more effort in research, it will be more prepared to deal with issues such as corruption, and therefore the expected result of the variable is negative, with greater development or a greater number of researchers and less corruption (Rock and Bonnet, 2004)

Within the category of socio-economic determinants, the education budget of each country could have been added, but it was decided to omit this determinant as there was a correlation with GDP, although not perfect.

The next category is political and institutional, within which the factor of the proportion of women holding seats in the parliaments of the various countries has been chosen. The author Swamy (1999), justified in his research that when public positions were occupied by women corruption was much lower than if they were occupied by men, therefore the sign of this variable is expected to be negative. The salaries of officials or the number of officials in a country are also variables to take into account but it has

been decided to omit them, as we could find a correlation between them and other variables in the model.

Regarding the demographic factors, it has been decided to choose the population density in the different sample countries, the expected sign is not clear since there are different contradictory studies as to how a greater concentration of the population affects corruption. Some studies state that the higher the population density, the greater the opportunities for association between corrupt officials in certain jobs, so in that case the relationship would be positive and significant. In contrast, other studies state that it would be easier to identify cases of corruption due to the low costs of administration due to economies of scale in a high-density population, and thus the relationship would be negative.

### 3.2. Estimation methodology

This section evaluates whether the above-mentioned determinants have a solid relationship with corruption. Panel data with stacked time series have been used in the model. To solve the endogeneity problem in the model we are going to use Weighted Square Minimums. In order to explain the research in an empirical way, a linear regression is used in which the variables explain the corruption perception index.

#### **General regression:**

$$\text{Corruption perception index} = B_0 + B_1\text{gdppc} + B_2\text{gini\_index} + B_3\text{unempl} + B_4\text{dens} + B_5\text{pol\_wom} + B_6\text{exp\_mil} + B_7\text{resch} + \mu.^2$$

The Weighted Square Minimum model will be presented below by means of tables of results. Tables 3 and 4 show the correlation matrix and the main statistics of the model variables.

Table 3 shows the main statistics such as the mean, the standard deviation and the maximum and minimum values reached by the data.

As we can see in table 4, the corruption perception index has a high correlation with GDP per capita, political positions held by women and the number of development and

---

<sup>2</sup> where gdppc stands for GDP per capita at constant PPP, gini\_index is the Gini, unempl is the rate of unemployment, dens is density of population, pol\_women is public positions held by women in the chamber, exp\_mil is military department spending and resch is number of research and development technicians per country.

research technicians. The correlation between the variables is not only high but also positive.

**Table 3.** Main Statistics

Variables	Obs	Mean	Std. Dev	Min.	Max.
gdppc	286	33189	14634	10211	1,028E+08
gini_index	286	31.51	3.483	23.70	39.00
cpi	286	63.39	16.57	33.00	96.00
unempl	286	9.201	4.493	2.750	27.47
dens	286	183.0	247.7	17.22	1391
pol_wom	286	24.06	9.337	8.700	42.50
exp_mil	286	3.211	1.303	0.8820	7.015
resch	286	3173	1554	916.7	7720

**Source:** Own elaboration based on the results of the program used.

**Table 4.** Correlation Matrix

	gdppc	gini_index	cpi	unempl	dens	pol_wom	exp_mil	resch
gdppc	1.000							
gini_index	-0.1786	1.000						
cpi	0.6513	-0.3462	1.000					
unempl	-0.3188	0.3985	-0.4360	1.000				
dens	0.1147	-0.2275	0.0947	-0.2475	1.000			
pol_wom	0.3106	-0.1668	0.5531	-0.0401	-0.1179	1.000		
exp_mil	-0.5279	0.3982	-0.3389	0.1113	-0.3060	-0.1746	1.000	
resch	0.5631	-0.3919	0.7870	-0.2443	-0.1415	0.6286	-0.3345	1.000

**Source:** Own elaboration based on the results of the program used.

## 4. MAIN RESULTS

### 4.1. Fixed effects estimation

Table 5 shows the results obtained using the weighted least squares of 286 observations. In table 6 temporal dummies have been added to the model, and the relevance of time in the model can be seen. The inclusion of the temporal dummies is to observe if there is a random trend in the variables or on the contrary they have a constant level and variability. Even so, in table 5 the variable of military expenditure has a higher level of significance than in table 6.

**Table 5:** Estimation results using weighted least squares 2005-2015

	<b>cpi</b>	<b>P-valor</b>
const	30.4 (4.58)	1.61e-10 ***
gdppc	0.000271 (4.27e-05)	9.32e-10 ***
gini_index	0.0367 (0.141)	0.7953
unempl	-0.716 (0.116)	2.34e-09 ***
dens	0.00901 (0.00191)	3.95e-06 ***
pol_wom	0.268 (0.0518)	4.55e-07 ***
exp_mil	1.05225 (0.429)	0.0147 **
resch	0.00568 (0.000378)	9.75e-38 ***

**Source:** Own elaboration based on the results of the program used.

It begins by commenting on the signs of each variable in Table 5 and contrasting them with previous literature. As for the GDPpc in the literature a negative sign was expected, in our research it is positive, this may be due to the greater development of the countries selected in this study compared to others. The sample of this research is European Union countries so the level of development is quite high. In this model, with an increase of 1 point in the GDPpc, corruption increases by 0,000271.

In the case of the gini index that measures inequality, it is not significant in the model, either because of the data used or because of the existence of another variable that better measures this determinant. As an interpretation, an increase of 1 point in inequality increases corruption by 0,0367. The expected sign is positive and in this case the model coincides with the literature.

The expected sign of employment is positive, in the model it is negative, this is due to the fact that in developed countries unemployment benefits are well regulated and high so there is no fear of reporting illegal acts or of losing one's job by committing them. If unemployment increases by 1 point, corruption decreases by 0,71.

The population density in the model has a positive sign, so a 1 point increase in population density increases corruption by 0,009. In the literature the sign of the variable was ambiguous, this is due to the fact that in rural towns where the population is more dispersed and the control to their governments is lower, it is expected that there is more corruption than in a big city where the population is more aware of public offices.

The expected sign in the literature when a woman occupies a political position is negative, in the empirical demonstration it is positive, this can be due to the countries studied or to the period. The increase of 1 point in women occupying public positions increases corruption by 0,268.

In the case of this study, it has a positive sign. In the literature, countries that are governed by a military regime are more corrupt than those that are not. In this case an increase of 1 point in military spending increases corruption by 1,05225. The variable used has a slightly lower level of significance than the rest, because some other determinant related to military regimes could have better specified the corruption index than spending on military departments.

Finally, expenditure on research and development personnel is analyzed, the expected sign is negative, in the study the sign is positive, the increase of 1 point in research and development expenditure increases corruption by 0.00568. This phenomenon could be explained by alleging that the more complex projects a country has, the greater the opportunity to commit fraud within them; whether it be granting favors, rigging public competitions, etc.

As for the  $R^2$ , the model has an explanatory capacity of 86.3% and with the p-value (2.4e-116) the variables of the model and the model itself are jointly significant.

The interpretation of table 6 is similar to the previous one, the difference being that as regards the  $R^2$ , the model has an explanatory capacity of 88.0% and with the p value (1.2e-112) the variables of the model and the model itself are jointly significant.

**Table 6:** Estimation results using weighted least squares, add temporal dummies 2005-2015.

	<b>cpi</b>	<b>P-valor</b>
const	31.2563 (4.30)	3.85e-12 ***
gdppc	0.000360197 (4.47293e-05)	2.66e-14 ***
gini_index	0.0983415 (0.135174)	0.4675
unempl	-0.446112 (0.120772)	0.0003 ***
dens	0.00848225 (0.0151998)	5.87e-08 ***
pol_wom	0.239127 (0.418121)	2.85e-08 ***
exp_mil	0.764902 (0.430996)	0.0771 *
resch	0.00580663 (0.000326614)	3.04e-47 ***
dt_2	-1.70468 (1.42382)	0.2323
dt_3	-4.50801 (1.42658)	0.0018 ***
dt_4	-6.38882 (1.43468)	1.24e-05 ***
dt_5	-7.20332 (1.43215)	9.01e-07 ***
dt_6	-8.23705 (1.45631)	3.97e-08 ***
dt_7	-8.27357 (1.45662)	3.50e-08 ***
dt_8	-8.20669 (1.47464)	6.35e-08 ***
dt_9	-8.82467 (1.48945)	9.57e-09 ***
dt_10	-9.53738 (1.49017)	6.90e-10 ***
dt_11	-9.81883 (1.48931)	2.28e-10 ***

**Source:** Own elaboration based on the results of the program used.

## 5. CONCLUSION

Corruption is defined as a situation in which public agents do not act in the manner expected by the population, but the extent of this corruption is limited by the environment in which it is found. Therefore, in a society where the level of education and equality is higher, corrupt acts are more difficult to proliferate. Freedom of the press and strong laws are also features that deter illegal acts, as discussed in the literature.

All of the above statements are contrasted with empirical research by authors such as Rock and Bonnet (2004) or Hwang (2011). Further analysis taking into account corruption-related determinants such as the level of unemployment favors the increase of corruption and also covers qualities of the country context.

This research emphasizes that there are several determinants that are linked to the value that corruption acquires and its way of manifesting itself. Determinants such as population density or expenditure in the military department that affect differently depending on the group of countries or the temporary period employed, in this work both are presented with a positive sign. This supports the fact that in the future studies of this phenomenon will continue to be carried out, since the temporal space covered is from 2005 to 2010 and all the countries belong to the European Union as a whole.

The disadvantage related to empirical research on corruption is in choosing the variables that specify corruption, which is why a discrepancy is understood in the literature. The way in which certain variables are measured also influences the conclusions, as well as the choice of variables, as in the case of the Gini Index, which does not manage to have significance in the work. It can also be the model used and the way of estimating it that affects the sign or the relevance of the coefficients. Therefore, to correct endogeneity errors, the model of weighted least squares has been used.

The great quantity and quality of empirical research on corruption and its determinants does not mean that the subject is consumed, unlike what it entails is a greater challenge for future work, where the search for new variables and sources will be more difficult. This work, in spite of the difficulties found, recognizes the economic conditions (according to the economic development, GDP per capita; unemployment, population density...) have a strong significance in relation to corruption.

The results of the model are not as expected with the literature previously analyzed, even though the variables used are significant and the model is specified. The discrepancies in unemployment, for example, are explained by the characteristics and social framework of the countries, as much as in this study as in previous studies on which the literature is based; thus the expected sign is negative but in the work it is positive.

The same phenomenon occurs with the expected sign in the variable of women who occupy political positions, according to the literature, an increase of women in public positions and a decrease of corruption, fact that in the empirical part of the work is contradicted since we obtain the opposite result, being able to be due to the period of time studied or to the characteristics of the chosen sample.

This paper uses a set of data obtained from the World Bank to obtain empirical evidence on the effects of different variables on the corruption perception index, obtained from Transparency International.

## 6. REFERENCES

Andvig, J. y Odd-Helge, F. (2000) "Research on Corruption: A Policy Oriented Survey". Michelson Institute y Norweigan Institute of International Affairs. Oslo.

Anand Swamy & Stephen Knack & Young Lee & Omar Azfar, 2000."Gender and Corruption," Center for development economics 158, Department of Economics, Williams College.

Amundsen, I. (1999) Political Corruption: An Introduction to the issues. Development studies and human rights. Working paper 7. Bergen: Chr. Milchensen Institute.

Banco Mundial, (1997) World Development Report: The State in a Changing World. Nueva York, Oxford University Press.

Bayley, D., 1966. "The effects of corruption in a development nation".

Braun, Miguel y Rafael Di Tella, (2004) "Inflation, Inflation Variability and Corruption" en *Economics and Politics*. Vol. 16, núm. 1, pp. 77-100. Hoboken, John Wiley & Sons.

Brunetti, A. y Weder, B., 1998. "Explaining corruption", Preliminary version, University of Saarland and University of Basel.

Doig, A. y Theobald, R. (2000) *Corruption and Democratization.*, Ed. Frank Cass, London.

Evans, Peter y Rauch, James (1996), *Bureaucratic Structures and Economic Performance in Less Developed Countries*, University of San Diego. San Diego.

Friedrich, C. J. (1990), "Corruption Concepts in Historical Perspective." in *Political Corruption: A Handbook*, Heidenheimer, A.J.; Johnston, M.; and LeVine, V.T. (eds.). New Brunswick, N.J.: Transaction Publishers.

Hope, K. (2000) "Corruption and Development in Africa" en Kempe Ronald Hope y Bornwell Chikulu (Eds.) *Corruption and Development in Africa. Lessons From Country Case-Studies*, St. Martins Press, New York.

Hwang, J., Jung, K. & Lim, E. (2011). *Corruption and Growth in Ethnically Fragmented World*. *The Journal of Developing Areas*, 44(2), 265-277.

Kaufmann, D. (1997), "Corruption: The Facts", *Foreign Policy*, Summer.

Klitgaard. R. (1988), *Controlling Corruption*. Berkeley: University of California Press.

Klitgaard, Robert; Ronald MacLean-Abaroa, & H. Lindsey Parris. *Corrupt Cities: a practical guide to cure and prevention*. Oakland: ICS Press, 2000.

Lui, F. T. (1985). An equilibrium queuing model of bribery. *Journal of Political Economy*, 93(4), 760– 781.

Leite, C. y Weidman, J., 1999. "Does mother nature corrupt? Natural resources, corruption, and economic growth". *International Monetary Fund Working Paper*, 99/85, July.

Little, W. (1992) "Political Corruption in Latin America". *Corruption and Reform*, Vol. 7, 41 – 66, Kluwer Academic Publishers.

Mauro, Paolo, (1995) "Corruption and Growth" en *Quarterly Journal of Economics*. Vol. 110, núm. 3, pp. 681-712. Cambridge, Harvard University.

Mauro, M., 1997. "The effects of corruption on growth, investment and government expenditure: a cross-country analysis". En Elliot (Ed.), *Corruption in the global economy*, Washington: Institute for International Economics.

Malem Seña, Jorge (2002), *La Corrupción: Aspectos éticos, económicos, políticos y jurídicos*, Barcelona, Editorial Gedisa.

Naim, Moses (1995), "The Corruption Eruption". *Brown Journal of World Affairs*.

Olson, M. (1982) *The Rise and Decline of Nations: Economic Growth, Stagflation, and Social Rigidities*. Yale University Press (November 18, 2019).

OCDE. *Consequences of Corruption at the Sector Level and Implications for Economic Growth and Development*. Paris: OECD Publishing, 2015.

Olson, M.(1982): *The rise and decline of nations: Economic growth, stagflation, and social rigidities*, New Haven, Yale University Press.

Palacios, J. (2014). Efectos de la corrupción sobre el crecimiento económico. Un análisis empírico internacional. *En-Contexto*, 2, 109-126.

Pharr, Susan J. y Robert D. Putnam (2000): *Disaffected Democracies*, Princeton: Princeton University Press.

Puviani, A.(1903): *Teoria della illusione finanziaria*, Palermo, V.C. en Madrid, Instituto de Estudios Fiscales, (1972).

Transparencia Internacional, (2009) *Corruption Perceptions Index 2009*.

Theobald, R. (1990), *Corruption, Development and Underdevelopment*. Durham. Duke University Press.

Reos, O. (2002) "Efectos Económicos de la Corrupción". Documento de la División de Programas de Estado y Sociedad Civi1. Banco Interamericano de Desarrollo, Washington.

Rock, M. & Bonnet, H. (2004). *The Comparative Politics of Corruption: Accounting for East Asian Paradox in Empirical Studies of Corruption, Growth and Investment*. *World Development*, 999-1017.

Rose-Ackerman, Susan. *Corruption and Government: Causes, Consequences, and Reform*. Cambridge: Cambridge University Press, 1999.

Thompson, John B. (2001): *El escándalo político*, Bracelona: Paidós.

Treisman, D. (2000), "The Causes of Corruption: A Cross-National Study," *Journal of Public Economics*.

Tullock, G., 1996. "Corruption, theory and practice". *Contemporary Economic Policy*, Vol. XIV. July: 6-13.

Tullock, G., 1967. "The Welfare Costs of Tariffs, Monopolies and Theft." *Western Economic Journal*.

Van Rijckeghem, Caroline y Beatrice Weder, (1997) *Corruption and the Rate of Temptation: Do Low Wages in the Civil Service Cause Corruption?* (Working paper). Washington, fmi.



